Remarks

All pending claims (i.e., claims 1-4 & 9-19) now stand rejected under 35 U.S.C. §102(e) as being anticipated by Knop et al. (U.S. Patent No. 6,885,644; hereinafter Knop). This rejection is respectfully, but most strenuously, traversed and reconsideration thereof is requested.

This paper represents Applicants' first opportunity to comment on the newly-applied, and commonly assigned, patent. These remarks have been prepared in consultation with Filipe Knop, the named inventor in the applied patent, as well as the lead inventor of the present application. A Declaration by Felipe Knop in support of one or more of Applicants' positions outlined herein can be provided if the Examiner believes it necessary for advancement of the current application.

Applicants request reconsideration and withdrawal of the anticipation rejection on at least the following grounds:

(1) The final Office Action fails to set forth a *prima facie* case of anticipation against Applicants' claimed invention; and

(2) Applicants' recited invention is patentable over the teachings of Knop.

Failure to State a Prima Facie Case of Anticipation:

Since the final Office Action provides no express reasoning as to why an artisan would have found the claimed invention to have been anticipated by the teachings of Knop, it is Applicants' understanding that the final Office Action asserts that Knop itself expressly, or impliedly, teaches Applicants' claimed invention. This is clearly *not* the case since at least some of the aspects recited in the present invention simply were not in existence at the time the Knop patent was filed, and therefore, could not be expressly or impliedly taught by the Knop patent. Rather, the present invention is an enhancement upon the basic teachings of Knop. This enhancement relates to the occurrence of a *quick restart* at a node in a membership group in a distributed, multi-node data processing system in which nodes communicate liveness indicia in the form of heartbeat signals via adapters coupled to each node.

More particularly, Applicants recite (for example, in claim 1) a technique which includes:

- subsequent to a *quick restart* at one node of a membership group, receiving a signal from at least one other node of the membership group at the one node experiencing the quick restart, *wherein the quick restart deletes locally stored membership group information at the one node.*

Cited against this aspect of Applicants' invention is column 5, lines 54-62 of Knop. This material states:

> As explained further below, adapters that are alive form an Adapter Membership Group (AMG), where members are organized (by way of example only) in a virtual ring topology. To ensure that all group members are alive, each periodically sends "HEART BEAT" messages to its "down-stream neighbor" and monitors the "HEART BEAT" messages from its "upstream neighbor". Protocols are run when adapters fail or when new adapters become functional. The goal of such protocols is to guarantee that the membership group contains at each moment all the adapters that can communicate with each other.

The cited material of Knop describe a heartbeat message protocol which references procedures for when adapters fail or when new adapters become functional. A careful reading of the material fails to uncover any discussion of occurrence of a *quick restart, per se.*

As explained in Applicants' specification, the current invention is directed to a method for detecting a situation for which a liveness daemon running on one or more nodes has been subject to a *rapid restart.* More particularly, the present invention is directed to a method for determining the existence of such a quick restart event and for providing proper indication thereof to other nodes within a network, with the objective of voiding group inconsistencies which are situations in which one node set sees another node set fail in some way without the other node set being aware of the fact that the first node set has also failed. (See page 1, lines 8-14.)

The word "restart" means to stop and then start again. The word "quickly" refers to a short time interval between the stopping and restarting at the one node. Applicants respectfully submit that the phrase *quick restart* should be given patentable weight when evaluating the claims of the present invention. There is simply no teaching or suggestion in Knop of a protocol for handling the issues associated with a *quick restart.* The word *restart* does even not appear in the Knop patent.

Additionally, Applicants recite that *the quick restart deletes locally stored membership group information at the one node*. A careful reading of Knop fails to uncover any teaching or suggestion of this concept. Should an inherency assertion be contemplated in the final Office Action, Applicants respectfully traverse such a conclusion. The Doctrine of Inherency is well settled in patent law, and requires a determination that the allegedly inherently characteristic *necessarily* flows from the teachings of the applied art. The final Office Action fails to present any line of reasoning that the recited functionality of Applicants' invention *necessarily* flows from the teachings of Knop, and thus, for this reason, fails to state a *prima facie* case of anticipation against the claims presented. Not only is there no quick restart described in Knop, but there is no discussion that the stopping at the one node during the quick restart deletes locally stored membership group information. Such information could alternatively be maintained in non-volatile storage.

Applicants' invention further recites:

- sending, from the one node to the at least one other node, a first message *which includes at least indicia of occurrence of the quick restart at the one node*, the sending being responsive to receipt of the signal at the one node

Cited against this element of Applicants' invention is column 5, lines 42-67 of Knop. These lines state:

> In order to monitor the health and connectivity of the adapters in each network, all adapters in the network should attempt to form an "adapter membership group" (AMG), which is a group containing all network adapters that can communicate with each other in the network.
>
> Note that each node may belong to several AMGs, one for each of its network adapters.
>
> To determine the set of adapters that are alive in each network, and adapter membership protocol is run in each of the networks.
>
> As explained further below, adapters that are alive form an Adapter Membership Group (AMG), where members are organized (by way of example only) in a virtual ring topology. To ensure that all group members are alive, each periodically sends "HEART BEAT" messages to its "down-stream neighbor" and monitors the "HEART BEAT" messages from its "upstream neighbor". Protocols are run when adapters fail or when new adapters become functional. The goal of such protocols is to guarantee that the membership group contains at each moment all the adapters that can communicate with each other.

> Each group has a "Group Leader" (GL) and a "Backup Group Leader". The group lease is responsible for coordinating the group protocols, and the backup group leader is ...

Again, a careful reading of this material fails to uncover any relevancy to Applicants' recited process for handling quick restarts at one node. The cited lines simply relate to a topology services statement process running at each node. The daemon handles certain aspects of topology propagation facilitating the concepts described in the Knop patent. However, Applicants respectfully submit that the concepts claimed in the present application are simply not described or suggested by Knop.

For example, a careful reading of the cited lines fails to uncover any suggestion that the one node having the quick restart, responsive to receiving a signal from at least one other node of the membership group, sends a first message *which includes at least indicia of occurrence of the quick restart at the one node.* The Knop patent fails to discuss *restart, per se,* let alone a quick restart, and the problems associated therewith. Thus, there is no message which originates from the one node which includes indicia of occurrence of a quick restart at the one node. Further, there is no teaching or suggestion in Knop that such a message is sent from the one node responsive to receipt of a signal from the at least one other node.

Yet further, Applicants' technique (as recited in claim 1) also includes:

- determining at the at least one other node, *from the indicia of occurrence of the quick restart and from locally stored membership group information indicating prior membership of the one node in the membership group, the existence of a quick restart at the one node,* and responding thereto by *sending a second message from the at least one other node to another node of the membership group which indicates that the one node is to be expelled from the membership group.*

The above-cited lines 42-67 of column 5 are again referenced in the final Office Action for a teaching of this concept. However, Applicants respectfully submit that the processing set forth is simply not taught, suggested or inherent in Knop, irrespective of the interpretation given to Applicants' recited occurrence of a *quick restart.*

In the above-recited aspect of Applicants' invention, the at least one other node (i.e., the node originally sending the signal to the one node having the quick restart) determines from the indicia of occurrence of the quick restart and from its locally stored membership group information indicating prior membership of the one node in the membership group, the existence of a quick restart at the one node. Responding to this determination, the at least one other node *sends a second message to another node in the membership group which indicates that the one node is to be expelled from the membership group.* In contrast, the "HEART BEAT" message and monitoring protocol of Knop simply does not address this aspect of the invention.

Note that if the Examiner is analogizing the phrase *quick restart* to the start of a node, then there is no sense in another node detecting its start and sending out a message that it should be expelled from the membership group. The Knop patent is directed to managing inclusion of active nodes in membership groups.

For at least the reasons noted above, reconsideration and withdrawal of the anticipation rejection stated in the final Office Action is respectfully requested.

The Recited Invention Patentably Distinguishes Over the Teachings of Knop:

Applicants respectfully submit that their recited invention patentably distinguishes over the teachings, suggestions and implications of Knop. The procedure recited by Applicants in the independent claims presented is directed to the problem of inconsistencies in group membership occurring as a result of a quick restart. This problem could arise where a liveness daemon at a node is stopped and then restarted quickly, or communications at a node where the rest of the node suffers a temporary interruption.

In situations where the liveness daemon running on one of the nodes is stopped and restarted in a short period of time, certain consistency problems can be engendered. For example, typically it happens that when the liveness daemon restarts, for each local adapter, a message is transmitted which "proclaims" the existence and the willingness of the sending node to become a group leader; that is, in generic terms, a request to know which other nodes are "out there". However, the other nodes in the group still consider the restarting node (and/or adapter) as being a part of the previous group. Accordingly, group membership is no longer consistent in

the sense that there is a lack of symmetry among the various nodes with regards to the "known" status of the other nodes. When the situation is caused by the "quick restart" of the liveness daemon, it is referred to in the application as the "bouncing node" problem or scenario.

This is the problem to which the recited invention is directed. Thus, the phrase *quick restart* has particular meaning in the present application. A careful reading of Knop fails to uncover any discussion of addressing either of the above-noted problems related to *quick restart* of a node. The word *restart* means to resume operation after an interruption. A careful reading of Knop fails to uncover any discussion if a protocol handling *restart* of processing at a node, but rather only starting of processing at a node. More particularly, Applicants respectfully submit that a careful reading of Knop fails to uncover any teaching or suggestion of a *quick restart* occurring at a node. For at least this reason, Applicants respectfully request reconsideration and withdrawal of the anticipation rejection to the pending claims.

Additionally, a careful reading of Knop fails to uncover any discussion or implication that responsive to a quick restart, locally stored membership group information at the one node is deleted. No discussion is provided in the final Office Action why such a step necessarily flows from the teachings of Knop.

Further, Applicants recite in each independent claim that the one other node determines the existence of the quick restart at the one node from the indicia of occurrence of the quick restart and from locally stored membership group information indicating prior membership of the one node in the membership group. There is simply no discussion in Knop of a procedure for ascertaining the existence of a quick restart at one node, let alone the particular procedure recited by Applicants in the independent claims.

Yet further, Applicants recite in response to determining that there was a quick restart at one node, the one other node sends a second message to another node of the membership group which indicates that the one node is to be *expelled* from the membership group. This detection and transmission of a message indicating that one node is to be expelled from a membership group is clearly distinct from the teachings of Knop. The restarted node can communicate with other nodes in the membership group, but for the reasons noted above, the restart must be identified and the restarted node initially expelled from the membership group to avoid the inconsistencies noted. Subsequent to the expulsion, the restarted node can then rejoin the

membership group, e.g., using the protocols disclosed by Knop. Advantageously, Applicants' recited facility causes the one node experiencing the quick restart to be expelled from the previous membership group sooner than possible in the prior art. No similar facility is taught or suggested by Knop.

It is well settled that there is no anticipation of a claim unless a single prior art reference discloses: (1) all the same elements of the claimed invention; (2) found in the same situation as the claimed invention; (3) united in the same way as the claimed invention; and (4) in order to perform the identical function as the claimed invention. In this instance, Knop fails to disclose various aspects of Applicants' invention as recited in the independent claims presented, and as a result, does not anticipate (or even render obvious) Applicants' invention. A careful reading of Knop fails to uncover any discussion of the occurrence of a *quick restart* at one node of a membership group. Thus, the problems addressed by Applicants' the recited invention are simply not present in the teachings and suggestions of Knop. Additionally, Applicants' independent claims recite a particular process for handling the quick restart to ensure that the quickly restarted node is expelled from the previous membership group expeditiously.

For at least the above reasons, Applicants respectfully submit that independent claims 1, 4 & 14 patentably distinguish over the teachings of Knop. Reconsideration and withdrawal of the rejection based thereon is therefore requested.

The dependent claims are believed patentable for the same reasons as the independent claims from which they directly or ultimately depend, as well as for their own additional characterizations. For example, claims 3, 6, 10, 11, 16 & 17 further characterize the quick restart indicia. Certain of these claims specify that the indicia comprises each of the three listed components. A careful reading of Knop fails to uncover any teaching or suggestion of sending an indication of a difference in instantiation number for the one node's adapter ID listed in the adapter membership group. Column 6, lines 10-67 of Knop are cited in this regard. However, this material does not discuss an indication of a difference in instantiation number of a quickly restarted node for the node's adapter ID listed in the adapter membership group. This process is simply not part of the Knop patent protocol.

Additionally, claims 8, 13 & 19 further specify the signal, first message and second message, and thereby the protocol for the fast notification of prior nodes of the membership group of the occurrence of the quick restart at the one node. A careful reading of Knop fails to uncover any teaching, suggestion or implication of a message comprising a "NOT YOUR NEIGHBOR" message. The "NOT YOUR NEIGHBOR" message was specifically written by Applicant Filipe Knop, subsequent to filing of the applied Knop patent. The *NOT YOUR NEIGHBOR* message is a message used by the one node having the quick restart to tell other nodes that it quickly restarted.

The application is believed to be in condition for allowance, and such action is respectfully requested.

If a telephone conference would be of assistance in advancing prosecution of this application, Applicants' undersigned attorney invites the Examiner to telephone him at the number provided.

Respectfully submitted,

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